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Designing payments for ecosystem services schemes: some considerations

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This paper reviews recent literature on Payments for Ecosystem Services (PES) to understand the conditions influencing the successful implementation of PES schemes and their associated outcomes over time. It highlights a number of important considerations in designing PES schemes such as household characteristics, land tenure arrangements, incentive structure, equity and gender issues, and the challenges involved in balancing environmental, economic and poverty reduction goals. In general, the literature shows that program effectiveness cannot be measured solely in terms of economic efficiency or ecosystem performance. Considerations around socio-economic, political and institutional contexts are just as relevant.

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Introduction

Natural ecosystems provide a range of ecological services (ES) such as clean water, biodiversity, carbon sequestration and recreational opportunities. Sustainable land uses can help to maintain these services. However, land users get no direct compensation for these services because they are rarely sold and bought in the conventional market [1]. The failure of markets to provide incentives to producers of ES creates environmental externalities — a situation where productive or consumptive activities inflict involuntary costs or benefits on others. As a result, the ability of a practice to support ES is often not considered in decisions about land use. Some recent global assessments, such as the Millennium Ecosystem Assessment and The Economics of Ecosystems and Biodiversity study [2–5], suggest that market-based instruments would be one effective means of internalizing externalities associated with the use of ES. Payments for ecosystem services (PES) schemes or programs have gained popularity in recent years to provide direct incentives to improve the ecological impacts of private land use decisions in both developed and developing countries [6]. ''PES schemes are designed 'to stimulate transactions in which a well-defined environmental service is bought by at least one user from at least one provider and the payments involve a positive incentive to the provider, and are conditional on performance''' [7].

Entire bodies of literature exist to discuss the ecological aspects of PES programs and the economic theory underpinning markets for ES [8] as well as institutional and political economy issues [9]. An equally important challenge, however, is understanding the conditions for successful implementation of PES schemes and their associated outcomes over time. This review focuses on recent research (particularly 2008 to present) aimed at understanding the factors that make PES schemes sustainable from a social, institutional, political and economic standpoint. The case studies were selected from a large pool of articles returned from multiple journal database searches that discussed one or more of the three dimensions of PES that we considered in our analysis: participation, incentive structure and poverty alleviation [10].

Recognizing that there are many other PES issues that could be considered, we selected these three dimensions because they are significant in the recent literature and in order to focus the review. It is also important to note that the literature reviewed herein focuses on PES experience in developing countries; despite some similarities, there are different considerations for schemes in developed country contexts. The findings and trends identified in this paper provide information that practitioners and policy makers can use to support more effective program design and assist researchers in prioritizing areas for further study.

Scheme design considerations

Participation

Community participation is an important factor in addressing many problems related to the public good nature of ecosystem services. This is an important consideration for PES schemes because program success requires a certain degree of participation on the part of local land users.

Research studies have shown that a number of factors affect the decision of an individual land user to participate in a PES scheme. Scholars have highlighted a number of household characteristics influencing the decision to participate, including education, income, debt, landholding size, opportunity costs of land, managerial experience, technical knowledge and political status [11–14]. In their study of determinants of participation in Costa Rica's payment for environmental services programs, Zbinden and Lee [15] found that economic status (farm size, income sources, and off-farm employment), human capital (skills, education, experience) and the availability of information were associated with the participation of households in the PES schemes. Well-defined property rights or tenure security has also been identified as a crucial factor in enhancing landowners' participation in PES schemes [16,17,18]. A number of studies further demonstrate that local management institutions (both formal and informal) are crucial for the successful adoption of PES programs [19].

PES arrangements may not match the seller's existing land-use decision-making model, posing a barrier to both initial participation and sustained participation over time [20]. Enabling sellers to bundle services may be particularly useful for area-based PES schemes where the protection or conservation of a piece of land could yield multiple services (and larger payments). While important, a landowner's decision to participate in a PES may not be based solely on the payment incentive. In a silvopastoral PES scheme in Nicaragua it was found that while farmers welcomed the payments, they attributed more importance to technical assistance and a growing market demand for their products in terms of their decision to alter their land use [21]. Technical assistance has had a positive influence on participation in other PES schemes as well [22].

Social dynamics and power relations are also important factors as the commodification of ES creates new hierarchies [23•]. Equity is, therefore, a key consideration in PES projects, particularly when those involved (buyers, sellers, intermediaries) have differing levels of power [9,24,25]. Issues include equity in access to the scheme; equity in decision-making in the design and operation of the program; and equity in outcome, both in terms of how the scheme impacts participants and non-participants [17]. Buyers and sellers will likely have different access to information and resources [26]; in many case studies, the buyers are smaller in number and more powerful. Organizers need to ensure that all parties have equal information and capacity when negotiating a payment amount. Equity discussions also encompass the gendered impacts of PES schemes [27,28] and should not be de-linked from analysis of a program's cost-effectiveness [29].

Incentive structure

Payment negotiation is a critical step in developing a PES program — it will influence both initial participation and the long-term ecological and socio-economic outcomes of a scheme. Payment and contract structure are the focus of many economists' studies of PES schemes and are considered central to their sustainability [30••]. Payment structure development should consider a number of factors including payment type, amount, timing and duration as well as performance indicators and targeting [31]. Cash transfers appear to be the most common type of payment in existing PES case studies. It is conveniently exchanged between buyers and sellers, it can be increased or decreased if the payment amount changes, it is transparent to all those involved and can be withheld if a participant is not complying with a scheme's arrangements. However, cash may not be the ideal payment type in all situations. In-kind payments in the form of productive capital (e.g. farm implements, rain water harvesting systems, etc.) may be more effective at supporting long-term community sustainability and avoid problems associated with cash influxes [32]. Identifying a socially and culturally acceptable type of payment that is viewed to be fair by the local community should be an essential part of any PES negotiation process [21]. Some have even suggested replacing the 'payment' concept with 'co-investment' language to include non-financial exchanges in PES-like arrangements [33].

Although uniform payments are the norm in many Latin American PES schemes, this is not necessarily the most economically efficient model since some sellers would likely accept a lower payment to implement a given practice and others should be paid more if they provide a greater level of ES [34]. On the other hand, a system of fixed payments is likely to be simpler to implement and may appear fairer to participants [35]. Some studies suggest that the perceived fairness of the distribution of the costs and benefits among participants is a key determinant of local acceptability of the PES program [36•,37]. Ultimately, the negotiated payment amount is often based on political agreement rather than real market value [18].

Existing PES literature provides no standard for payment frequency or duration. Many experts argue that payments should occur at intervals (rather than a lump sum) to ensure that the ES continues to be provided for the duration of the contract. Conditional cash transfers may also stimulate higher welfare gains over time [38]. In the case of Costa Rica's PES program, one of the longest running to date, payments are made over a five-year period after which the landholder is free to re-negotiate the payment level or sell the rights to another provider. However, the provider is held legally responsible for managing or protecting the forest for 20 years [35]. In some cases, however, long-term contracts may not be